

Alexander C. Swain's book

Nantucket

June 5th

Samuel Goodridge Fairfield

1837

Salem Mass

1843

Alexander C. Swain's book June 5th

1837.

86 in all
10 large ones

May 1840

On the 29th of May I Charles S. Gibbs
shipped on board the ship Charley Carroll of Nantucket

On the 29th we weighed anchor and bound on a south
sea whaling voyage

On the 31st we saw a school of blackfish we lowered away
our boats and killed 4 they made 16 barrells of oil

June 1840

June the 17th we made Flores one of the Western Islands
we lay off and on getting recruits untill the 20th
we then left the Island and went cruising among the
group

July 1840

July the 18th we saw a large sperm whale we lowered
the boats and the bow boat struck him and killed him
he made 125 barrells of oil

On the 28 we put it on shore at Fayol one of the
same group we then left the Island and steered to the south

August 1840

On the 3rd we saw a school of whales we lowered at
the bow boat killed one he made 130 barrells

August 1840

On the 15th we passed the Isle of Gal and Bonavento belonging to the Cape Verde group.

September

On the 8th we saw a school of whales we lowered the larboard boat fastened to one and he struck her with his flukes and cut her in two the starboard boat fastened to one and killed him he made 15 blbs

October

On the 1st we went in at Rio De Janeiro in Brazil we landed 130 blbs of oil to be sent home we got a supply of water and on the 8th we weighed anchor and steamed to the southward

On the 18th it was rough weather and the sea stove the bow boat

On the 21st we saw a school of rite whales we lowered the boats but could not get any on the morning of the same day we saw a large sperm whale we lowered the boats and bulled until noon but could come up with him

November

On the 4th about 4 o'clock A.M. raised Staten Land it lays in latitude 54.48 and longitude 63.42

On monday the 9th we saw 23 icebergs

On tuesday the 10th we saw one of the Diego Alandars they lay in latitude 54.48 and longitude 63.42 we saw more ice every day for two weeks

we then steamed to the northward along the coast of South America



December 1840

On the 1st about 6 o'clock A.M. we saw the Island of Juan Fernandez it lay in latitude 33.45 and lon 79.6 we also a whale ship on the weather ~~two~~ quarter about 10 o'clock she kept off before the wind we tacked and stood that way and at one o'clock we both lowered our boats after a large whale we chased him four hours but could not come up with him we then spoke the said ship and it proved to be the Pacific of New Bedford capt Palmer 110 days out 120 bbls of sperm oil

On the 4th we spoke the ship Euphrates of New Bedford 35 months out 1400 bbls of sperm oil on the same day we spoke the ship Planter of Nantucket 38 months out 1400 bbls of sperm oil on the same day we also spoke the ship Metacomb of Nantucket 38 months out 1650 bbls of sperm oil

On the 5th we spoke the ship Elizabeth Starbuck of Nantucket 36 months out 1600 bbls sperm oil

On the 30th we saw a school of blackfish we lowered the boats and the bow boat struck one and the iron drowed and we lost him on the same day one of the men fell overboard from the lee bow and the ship passed over him we lowered the starboard boat and saved him he being a good swimmer

January 1841

On the 4th and 5th we lowered for a school of black fish but we could not get any

On the 6th we lowered for a school of blackfish and the waste boat struck one and the iron drowed the bow boat struck one and lanced him and the iron drowed he went about half a mile and died he made 5 bbls of oil

January 1841

On the 8th we raised a school of whales two points off our weather bow and about 6 miles off it being near sun down they were soon out of sight

On wednesday the 13th we raised ~~Albemarle~~ one of the Gallapagos group it lay in latitude 0.50 and longitude 91.25

On the 15th we saw Charles Island one of the same group it lay in latitude 1.30 and longitude 90.83

On the 16th ~~two~~ two boats went on shore to get turopin we loaded the two boats

On the 17th two boats went on shore at Albemarle and loaded ~~the~~ with turopin and four men belonging to the ship deserted

On the 18th we spoke the ship Richard Mitchel of Nantucket Captain Jarner 18 months out and 250 bbls of sperm oil

On the 21st we spoke the ship Washington Captain Bayley of Nantucket 8 months 450 bbls sperm oil

On the 22nd we spoke the Mound Wallaston of Salem Captain Rose 8 months out 450 bbls sperm oil on the same day we also spoke the ship Canton of New Bedford Captain Cary 26 months out 1800 bbls sperm oil on the same day we spoke ship Washington of Nantucket 8 months 450 bbls sperm oil

On the 28th we spoke the ships Washington the Richard Mitchel and the America 30 months out 2500 bbls of sperm oil

JANUARY 1841

On the 28 about 9 o'clock A.M. it came on to rain and lightning the lightning struck the main royal mast and split it in ten thousand pieces it also split the main ~~gallant~~ mast and paked off and done no more damage about half an hour after it was done the wheel a flash of lightning struck me & senseless and I remained so for about an hour when I came to. It done no more damage.

FEBRUARY

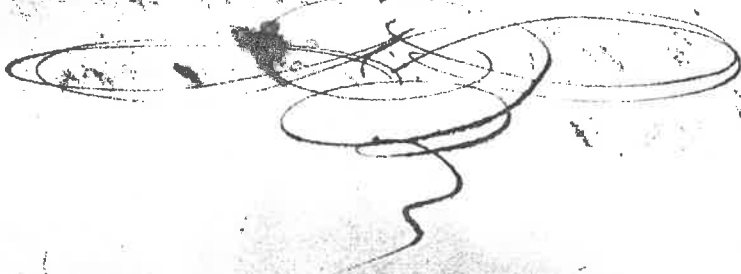
On tuesday the 2nd we lowered a sperm whale the larboard board struck him and he wounded the waist board pulled up and bent on their line the whale run about two hours they lanced him and then cut the line the whale run about a quarter of a mile farther and then turned up he made 90 bbls of oil

On friday the 5th we spoke the ship Kingston of Nantucket 8 months out 900 bbls sperm oil

On saturday the 6th we spoke the ship Mary of Nantucket 10 months out 600 bbls of sperm oil

On sunday the 7th about 5 o'clock P.M. we lowered for a sperm whale the waist board struck him and the fore iron drewed and the other broke and we lost him

On tuesday the 9th we spoke the ship young Hero of Nantucket Captain Dally 34 months out 2400 bbls of sperm oil



Feb 20th 1841

On wednesday the 9th about one o'clock P.M.
one of our harpooniers a negro named Peter Sands
was fishing off the martingales and fell overboard
we cleared away and lowered the larboard boat but
unfortunately for him he could not swim and
before the boat got to him he sank and we saw
him no more in about an hour afterwards
we spoke the ship Richard Mitchel of
Nantucket

On thursday the 11th about 8 o'clock A.M.
we saw a school of sperm whales we lowered
the boat and the larboard boat fastened to one
and killed him he made 70 blb of oil

On thursday the 18th we spoke the ship
Young Hero of Nantucket we also spoke the ship
Richard Mitchel of Nantucket Capt Garner

On saturday the 20th we spoke the ship
Magnolia of New Bedford Captain Barnard
27 months out 155 blb of sperm oil

On wednesday the 24th and 25th we saw a
school of whales we lowered the boat and
chased them all day but could not get any

March

On friday the 5th we spoke the ship
Alexander Coffin of Nantucket 6 months
out 100 blb of sperm oil

NOVEMBER 1841

~~On the 5th we went to the~~

On Friday the 12th about 5 o'clock PM we saw a school of sperm whales we lowered the boats and got two they both made 63 bbls of oil

On Tuesday the 20th we saw a school of whales we lowered the boats and got one he made 25 bbls of oil

On Wednesday the 31st we saw a school of sperm whales we lowered the boats about 4 o'clock PM and about sundown the larboard boat struck one he ran to the windward of the ship the line got full at the loggerhead and we capsize the boat it came on deck and the ship had sight of them and they remained so untill 1 o'clock the next day when we saw them from the main deck we lowered a boat and picked them up they were all nearly dead scarcely sufficient strength to stick to the boat but they all recovered in about a week

April

On Monday the 5th we spoke the ship Jefferson of Charleston 8 months out and 480 bbls of sperm oil

On Tuesday the 16th we saw a school of sperm whales we lowered the boats and the bow boat fastened to one and killed him he made 20 bbls of oil

On the 20th we saw a school of whales we lowered the boats and chased them but did not get any

April 1841

On Sunday the 21st we saw three of the
Marquesas islands viz Pohna, Eapo and
Chevaha it lays in latitude 9.41 and longitude 139.2^W
the three Islands are 30 miles from each other

On Monday the 22nd we anchored in Ported Bay
Chevaha where we got wood water and other
necessaries This cruise was on the line from the
Galapagos islands to the Marquesas islands

May

On Tuesday the 5th we weighed anchor and worked
up to the northward and eastward

On Tuesday the 27th we saw a school of sperm whales
we lowered the board and the starboard boat struck one
and killed him he made 18 bbls of oil

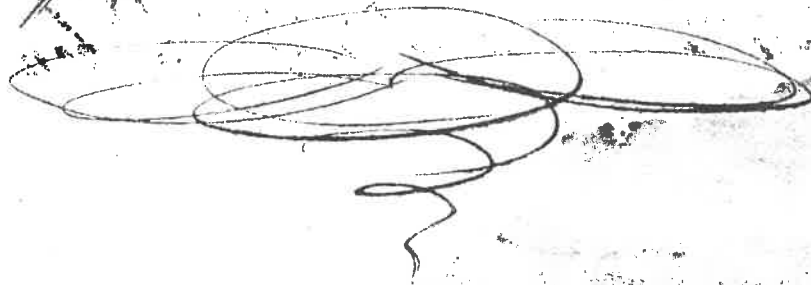
On Wednesday the 28th we spoke the Barque Jane
of New Bedford 12 months out 950 bbls sperm oil

On Thursday the 29th we spoke the ship Rose
of New Bedford 13 months out 1200 bbls sperm oil

June

On Wednesday the 12th we saw a school of whales
we lowered and the starboard boat fastened to one
and the iron drewed the starboard boat fastened to
one and killed him he made 90 bbls of oil

On the 14th and 15th we spoke the ship Cambria
of New Bedford 25 months out 1300 bbls sperm oil



JULY 1841

On monday and tuesday the 19th and 20th we spoke.
The ship Cyrus of Chantucket 9 months out 250 blls
of sperm oil

On saturday the 30th we saw a school of whales we
lowered the boats and the bow struck one and killed him
he made 21 bls of oil

AUGUST

On monday the 1st we saw a school of whales we lowered
and the starboard boat fastened to one and killed him he
made 36 bls of oil

On tuesday the 2nd we saw the same school all four boats
fastened and each one killed a whale the four whales
made 100 bls of oil

On wednesday the 18th we saw a school of sperm whales
we lowered the boats and the larboard fastened to one and
killed him
the starboard boat struck one and one of the masts broke
and the other broke the bow boat chased him and fastened
to him and killed him the two whales made 44 bls of oil

On saturday the 21st we spoke the ship ~~Cyrus of Chantucket~~
Audley Clark of Newport 8 months out 400 bls
of sperm oil

SEPTEMBER

On the 17th I fell overboard from the lee bow
and went under the ship and came up as soon
they threw a rope to me from the ship and hauled
me on board



September 1811

On wednesday the 19th we saw a school of whales we lowered in the forenoon and got a small whale we then came on board of the ship and in the afternoon we lowered the boat again the bow boat fastened to a large whale and he struck the boat about amidst ships and cut her in two the captain went up and fastened to him and while he was lowering him he bit her in two and then chewed her to pieces the larboard fastened to him and killed him and the waist boat picked up the men there was not any one injured the two whales made 110 bbls of oil

On thursday the 20th we spoke the ship *Stetira* of Antucket 21 months out 1900 bbls of sperm oil

On saturday the 27th we spoke the ship *Splendid* of Edgartown 19 months out 1600 bbls of sperm oil

On the 28th we spoke the ship *Eric* of Fairhaven 9 months 400 bbls of sperm oil

On the 29th we we saw a school of whales we lowered the boat and the larboard fastened to one and killed him they have a drug iron in another as he was passing by but did not kill him the larboard fastened to one and killed him the two whales made 54 bbls of oil

On the 30th we spoke the ship *Mariner* of Antucket 1 month out 250 bbls of sperm oil



October 1841

On the 1st we saw a school of whales we lowered the boats and got two on the 2nd we saw another school we lowered the boats and killed two the four made 58 blls of oil on the 2nd we spoke the ship Mary of Connecticut 24 months out 1000 blls of sperm oil

On Sunday the 3rd we spoke the ship George Washington of Wareham Mss. 19 months out 450 blls of sperm oil

On Monday the 4th we saw a school of sperm whales we lowered the boats and chased them but they were going to the windward and we could not catch them

On the 8th we lowered for a school of sperm whales but they were going so fast that we could not come up with them

On Saturday the 9th we saw a school of sperm whales we lowered the boats the starboard the larboard and waist boats each got a whale the three whales made 60 blls of oil

On ~~Saturday~~ Sunday the 10th we spoke the Barque Samuel Indaba of London 16 months 900 blls of sperm oil

On Saturday the 16th we saw a school of sperm whales we lowered the boats and the starboard fastened to one and killed him he made 28 blls of oil

On Monday the 18th we saw a school of sperm whales we lowered but could not come up with them

On Tuesday the 19th we saw a school of sperm whales we lowered and the larboard boat fastened to a large whale and killed him he made 85 blls of oil

On Saturday the 23rd we spoke the ship George Washington of Wareham 19¹/₂ months out 450 blls of sperm oil

October 1841

On Tuesday the 26th we raised a school of sperm whales we lowered the boat and the larboard boat the starboard and the waist boats each got one the three whales made 77 barrels of oil.

On the 28th we saw a school of sperm whales we lowered the boat and the larboard boat struck one and one iron draved and the other broke and we lost him the starboard boat struck one and killed him he then threw a drug iron in another but the tail of the drug parted and the whale went off spouting thick blood the whale that the larboard got made 28 bls of oil.

On Friday the 29th we picked up the starboard boat dragged whale he made 20 bls of oil.

On Saturday the 30th we lowered for a school of sperm whales but they perceived us and ~~we~~ took to running to the windward and we could not catch them.

November

On Thursday the 4th we saw a school of whales we lowered the boat and the starboard boat struck one and killed him he made 20 bls of oil.

On Friday the 5th we saw a school of sperm whales we lowered the boat and the larboard boat struck one and killed him he made 30 bls of oil.

On Sunday the 21st we raised a school of sperm whales we lowered the boat and the waist boat got one and the larboard boat got one the two whales the two whales made 50 bls of oil.



November 1871

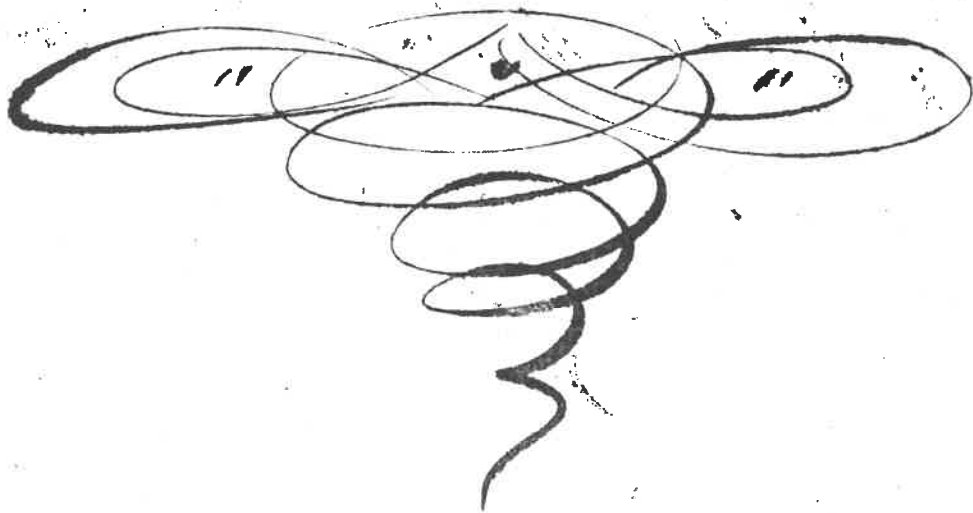
On Tuesday the 23rd we saw a school of whales we lowered the boat and the starboard struck a large whale he went about 40 yards from the boat he then turned around and came full speed for the boat and struck her abreast the tub oar where I sat I raised up as he struck the boat and fell over his head he hit the boat in two the irons drew and we saw once afterwards he came up with the line tied in his mouth we were in the water about an hour when the larboard boat came and picked us up fortunately there was not any body injured

On the afternoon of the same day we saw the same school of whales we lowered the boat and the larboard and starboard boat each got one the two whales made 53 bls of oil

On Wednesday the 24th we saw a school of whales we lowered the boat and the larboard boat fastened to one and killed him he made 32 bls of oil

On Sunday the 28th we saw a school of sperm whales we cleared away the boat and lowered for them and the starboard boat got three the larboard boat got one and the waist boat got two the six whales made 100 bls of oil

This cruise was on the line from longitude 120 to 130



December 1841

On the 8th we made all sail and steamed to the southward and westward for the Society Islands.

On Tuesday the 10th we made Prinel of Wales Island one of the Dangerous Archipelago group it lays in latitude 12 south and longitude 146 west in the afternoon of the same day as we was running along close to the land we saw a school of sperm whales within fifty yards of the shore we cleared away and lowered the board and the larboard and waist each got one the two whales made 50 blb of oil.

On the 15th at sundown we saw ~~the~~ one of the ^{3rd} Society Islands it lays in latitude 17th south longitude 149.14

On Thursday the 16th we took a pilot and went in and anchored we got wood water and other necessaries and discharged 5 men that had shipped for the Swiss & we shipped two more men.

January 1842

On Wednesday the 5th we weighed anchor and steamed to the southward and eastward.

On Tuesday the 20th we saw a school of whales we lowered the board the starboard boat fastened to a large whale and killed him the larboard and waist boats each got a small one the three whales made 120 blb of oil.

On Friday the 30th we raised Pitcairns Island one of the Society group it lays in latitude 25th south and longitude 130.25 west.

February

On the 1st we went on shore at Pitcairns island and got potatoes and yams this the island is inhabited by no persons descendan of the mutineers of the ship Bounty.

February 1842

On the 2nd we left Pitcairn Island and stood to the eastward

On Monday the 9th about 3 o'clock in the morning there came on a gale of wind from the northward we called all hands and took in all sail down to a close reefed main topsail which we lay to under untill the 11th about 9 o'clock in the forenoon when ~~we~~ the gale abated and we made sail

March

On Thursday the 24th we spoke the ship George Washington of Wareham 23 months out out 850 bls of sperm oil

On Friday the 25th we spoke the ship Charles of New Bedford 9 months out 400 bls of sperm oil we also spoke the George Washington on the same day

April

On Saturday the 2nd we spoke the Bourque Equator of New Bedford Captain Fisher 30 months out 1100 bls of sperm oil

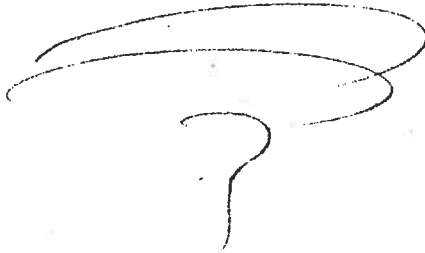
On Thursday the 7 we saw a school of sperm whales we lowered the boats and the waist boat fastened to us and killed him he made 28 bls of oil

May

On Sunday the 1st we spoke the ship Washington of Nantucket 24 months out 800 bls of sperm oil

On the 2nd we spoke the ship Mary of Nantucket 25 months out 1100 bls of sperm oil

On the 3rd we spoke the ship Robert Edwards of New Bedford we also spoke the ship Mary of Nantucket on the same day



May 1842

On Thursday the 3rd we saw Galapagos on of the
Galapagos Group the group lays from 2 north to 2 south

On Friday the 6th we spoke the ship Washington

On Wednesday the 18th we saw the town of Sherango
in Peru S. America we were then steering to the southward
along the land we spoke the ship Furshannes of
Falmouth Mass capt. Deas 23 months out 1150 bls of
sperm oil

On Saturday the 21st we spoke the ship Lalla Rookh
of New Bedford Captain Reynolds 19 months out 1000 bls
of sperm oil on the same day we saw a school of
whales in company with the said ship ~~we~~ both lowered
our boats and our starboard boat fastened to a large
whale and killed him he made 80 bls of oil we gave the
said ship 40 bls of it

On Wednesday the 25th we went in at Tombez in Peru
this town lays in latitude 9 south we got wood water &c
and on the 5th of June we weighed anchor and steered
to the westward

June

On Tuesday the 2nd we saw a schools of sperm whales
but they were a going to the windward so fast that we
did not lower

On Monday the 13th we raised Chatham Island

On Tuesday the 14th we saw Hood Island both belonging
to the Galapagos Group

On Friday the 15th we anchored at Chatham Island
we got about 200 turpim and on the 23 we weighed
anchor and steered to the westward

JUNE 1842

On sunday the 26th we spoke the Ship Nantucket of Nantucket 12 months out 700 bbls of sperm oil we also spoke the ship Minerva Smith of New Bedford on the same day

JULY

On saturday the 23rd we spoke the Barge Bolton of Stonington 25 months out 1100 bbls of sperm oil

AUGUST

On the 1st and 2nd we spoke the Ship Eric of Fairhaven 20 months out 600 bbls of sperm oil

On the 4th one of our men a native of Madeira died after two months sickness of the consumption On the same day at 8 past 12 we hauled aboard the main topsail and buried him

On saturday the 12th we spoke Ship Charleston Henry of Nantucket 20 months out 350 bbls of sperm oil

On wednesday the 24th thursday the 25th and friday the 26th we spoke the Ship Cyrus of Nantucket 22 months out 1000 bbls of sperm oil

On friday the 26th we saw a school of sperm whales when we were in company with the Cyrus we lowered our boats but we could not come up with them

SEPTEMBER

On thursday the we saw a school of whales we lowered the boats and the starboard and the larboard boat each got one the two whales made 50 bbls of oil

On sunday the 4th we spoke the Brigg Sarah Atgill 23 days from Boston bound to the Sandwich Islands with a cargo of machinery

September 1842

On Friday the 9th we saw a school of sperm whales we lowered the board and the larboard fastened to one and the irons drawed and the wait boat chased him and fastened to him and killed him he made 35 bbls of oil

On Friday the 19th we spoke the Ship Erie of Fairhaven on the same day we also spoke the Ship Samuel Robinson of New Bedford 11 months out 300 bbls of sperm oil

On Monday the 25th we spoke the Ship Adeline Gibbs of Nantucket 13 months 500 bbls of sperm oil

October

On Tuesday the 6th and Wednesday the 7th we spoke the Ship Pocow of New Bedford 30 months out 2300 bbls of sperm oil

On Thursday the 15th we spoke the Ship Christopher Mitcha of Nantucket 11 months out 450 bbls of sperm oil

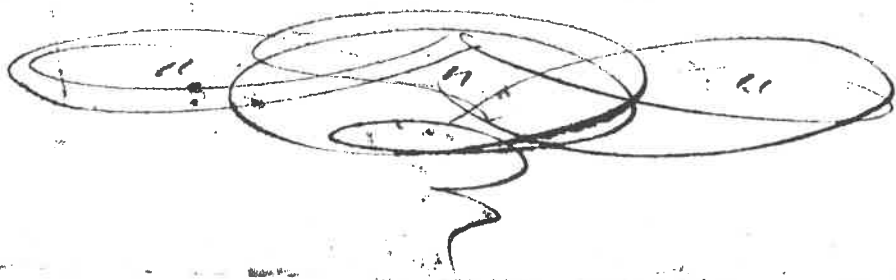
On Friday the 16th we saw a school of sperm whales we lowered the board and the starboard fastened to one and killed him he made 25 bbls of oil

On Monday the 19th we saw a school of sperm whales we lowered the board and the wait boat fastened to one and killed him he made 20 bbls of oil

On Monday the 26th we saw a school of sperm whales we lowered the board and chased them untill sundown but did not get any

November

On Tuesday the 1st we saw a school of sperm whales we lowered the board about 5 o'clock P.M. and the larboard and the wait boats each got one the two whales made 30 bbls of oil



November 1842

On Saturday the 12th we saw a school of sperm whales about 10 o'clock ~~am~~ ^{at} M we lowered the board the larboard boat fastened to one and killed him and the board came on board the ship again we chased the whales with the ship and about 2 o'clock we got near enough and lowered the board again and the starboard boat struck one and killed him the larboard boat struck one and the iron drewed and we lost him the waist boat struck one and killed him the three whales made 50 bbls of oil.

On Tuesday the 15th we saw a school of sperm whales ~~am~~ we chased them with the ship but could not get near enough to lower.

On Friday the 18th we saw a school of sperm whales we lowered the board and the larboard boat struck one and the iron strap parted and we lost him the starboard struck one and killed him he made 20 bbls of oil.

On Friday the 25th we spoke the Ship Champion of Edgartown 11 months out 800 bbls of sperm oil.

On Saturday the 26th we saw a school of sperm whales off the sea guarter we lowered the board and the larboard boat struck one and killed him he made 25 bbls of oil.

On Monday the 28th we made sail and started S. S. W. for the Marquesas Islands.

December

On Sunday the 4th about 10 o'clock ^{at} M we saw Woods Island about 11 o'clock we saw Dominica in a little while after we saw Magdalena all belonging to the Marquesas group. Woods Island lays in Latitude 9. 26 and Longitude 138. 52 Dominica lays in Latitude 8. 56 and Longitude 139. 9 West Magdalena lays in Latitude 10. 25 and Longitude 138. 49 West.

we lay off and on at Dominica trading for hogs fruit &c until Friday the 9th we then started for Ohebaia or New Hebrides one of the same group this Island lay in Latitude 2. 41 South and Longitude 139. 2 West.

This cruise ~~am~~ was on the Equator in Longitude from 125th to 135th.



December 1842

On Saturday the 10th we took a pilot and went in at Chiriquia we got a supply of wine water potatoes fruit &c and on the 28th we weighed anchor and again started for Dominica which we made on the 28th we lay off and on at Dominica trading until January the 1st we then started to the northward for the Equator

January 1843

On Friday the 6th we spoke the Ship Christopher Mitchell of Nantucket 13 months out 100 bbls of sperm oil

On Monday the 9th we spoke the Ship United States of Nantucket Captain North 12 months out 600 bbls of sperm oil

February

On Wednesday the 2nd about 10 o'clock A.M. we saw a school of sperm whales on the lee beam we squared away and ran for them and about one o'clock we got near enough and lowered the boats and the starboard boat fastened to one and a small calf came up under the boat and seized her and the line got foul around the loggerhead and parted and we lost the whole the boat was but slightly injured

On Thursday the 10th we saw a school of sperm whales we lowered the board and the starboard and starboard board each got one the two whales made 30 bbls of oil

On Friday the 11th we saw a school of sperm whales and about 4 o'clock P.M. we lowered the boats but they saw the ship and we could not come up with them

March

On the 2nd ~~at~~ about half past 6 P.M. we saw the comet we was then on the Equator in longitude 133 west and the comet bore N.E. 1/2 N.

On Friday and Saturday the 3rd and 4th we spoke the Ship Montezuma of Nantucket 15 months out 350 bbls of sperm oil on the 4th we also spoke the Ship Foster of New Bedford 17 months out 450 bbls of sperm oil

March 1848

On Monday the 6th about 2 o'clock P.M. we saw a school of sperm whales in company with the ship Montaigne we both lowered our boats and chased them until sundown but could not overhauled them on the same evening we spoke the Montaigne

On Wednesday the 8th we saw a school of sperm whales we lowered the boats and the starboard and waist boats each got one the two whales made 40 bbls of oil about 2 o'clock P.M. of the same day we lowered the boat for the same school of whales and the starboard boat fastened home and killed him he made 22 bbls of oil

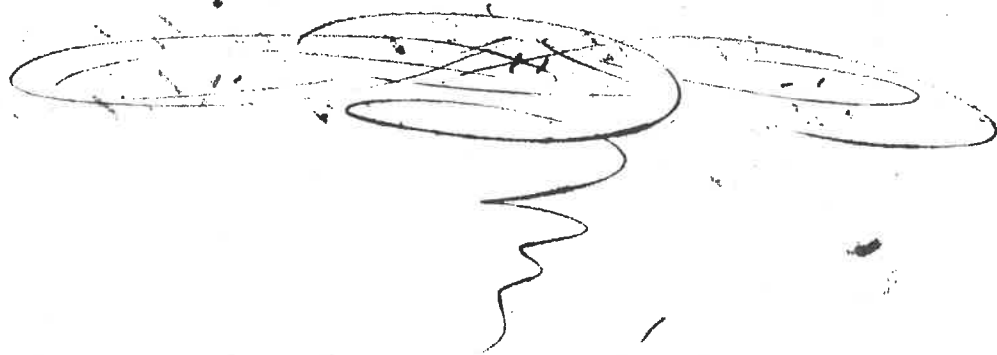
On Friday the 10th we saw a school of sperm whales about 5 miles off the weather beam we lowered the boat and pulled up to them and the starboard boat killed 3 and the starboard boat got 1 the starboard boat while fast to a whale lanced a loose whale as he was passing by and the ship Montaigne got him the 4 whales made 50 bbls of oil

On Sunday the 12th we spoke the ship Montaigne with 450 bbls of sperm oil

On Sunday the 12th about one o'clock P.M. we saw a school of sperm whales we lowered the boat and the starboard and waist boats each got one the two whales made 70 bbls of oil

On Tuesday the 21st we saw a school of sperm whales we lowered the boat about 2 o'clock P.M. and the starboard boat got a cow and the waist boat got her calf the two whales made 20 bbls of oil

On Saturday the 26th we spoke the ship Montaigne of Nantucket 15 months out four hundred and fifty barrells of sperm oil



April 1843

On Saturday the 1st we spoke the ship Atlantic of New Bedford 32 months out 1000 bbls of sperm oil.

On Sunday the 2nd about 9 o'clock A.M. we saw a school of sperm whales we lowered the boat and the larboard boat struck a small calf the starboard boat pulled up and struck a cow then the waist boat pulled up and struck another cow and killed him the larboard cut from the calf and struck a cow and the line parted and they lost him the starboard boat to line parted and they lost him the larboard boat struck the calf again and killed him the two whales made 25 bbls of oil.

On Monday the 3rd we saw a school of sperm whales 2 pointed on our weather bow and about 3 miles off but they were going to the windward so fast that we soon lost sight of them.

On Friday the 7th about 9 o'clock P.M. we saw a school of sperm whales on the lee beam and about 3 miles off we lowered the board and chased them but they were soon out of sight and we came on board again and squared away and run untill 1 o'clock P.M. when we saw them again we lowered the board again and the waist boat fastened to one and killed him he made 25 bbls of oil.

On Monday the 9th about one o'clock A.M. we saw a school of sperm whales we lowered the board and the starboard boat struck one and the iron drew the waist boat went alongside of one and the harpooner threw an iron against him and it bent double and would not go in on account of the skin being slack we chased them untill night and could not get any.

On Saturday the 14th about 6 o'clock A.M. we saw a school of sperm whales four pointed on the weather bow and about 4 miles off we lowered the board and the starboard boat fastened to one and killed him he made 25 bbls of oil.

On Sunday the 23rd we lost the Equator and steered to the northward for the Marques Islands.

On Sunday the 30th we saw Poohoa one of the Marques Islands it lay in latitude 9 south and longitude 140 west.

May 1843

On Monday the 1st we saw Hoods Island Eops and Ohioroa all belonging to the Marques group Hoods Island lay in latitude 9.26 and Longitude 138.52 Eops lay in latitude 9.30 and longitude 138.30 West Ohioroa lay in latitude 9.41 South and longitude 139.2 West

On Tuesday the 2nd we took a Pilot and went in at Ohioroa and anchored we got wood water dogs fruit and other necessities.

This cruise was on the Equator in Longitude from 138^{West} to 139

On

JUNE

On Wednesday the 6th we weighed anchor and steered to the Westward

On Thursday the 7th we made Robert Island this Island is uninhabited we took a boat and went on shore and caught a boatload of fish we cruised around the island until Sunday the 10th when we left it and steered to the southward and westward this Island lay in Latitude 8.24 South and Longitude 140.48 West

On Saturday the 19th about 2 o'clock P.M. we saw a school of whales 4 points on the lee bow and about 2 miles off we lowered the board and the starboard boat fastened to one and the line parted the larboard boat fastened to the same whale and killed him he made 30 bls of oil

On Tuesday the 20th we caught a Shark 11 feet long

On Saturday the 24th we made Deans Island one of the Dangerous Archipelago Group it lay in latitude 14.58 South and Longitude 147.50 West the wind was blowing from the westward and we beat to the windward and on the Monday the 26 we passed through the passage between this Island and Lagoon Island which is about 4 miles to the westward of Deans Island after getting through the passage we steered S.W.

On Tuesday the 27th about 5 o'clock A.M. we raised Marten this also belongs to the Dangerous Archipelago Group it lays in Latitude 22 16 South and Longitude 148 West

June 1848

On Friday the 29th we spoke the schooner Sarah Ann of Harwich in Europe she was two days from the Society Islands she was bound to the Chain Islands trading for coconut oil

On the same day we saw Taro Island this Island lays about 40 miles distant from Otaheite it belongs to the Society Group.

July 1848

On Monday the 3rd took a pilot and went in at Otaheite one of the Society we first anchored in Tounoa harbour on Tuesday the 4th we weighed anchor and steered the ship through Tounoa passage into Port Caitipha bay which is about 3 miles distant we coopered 1800 bls of oil and got wood water fruit and other necessities and took six passengers two of which we took from the Consul's hands sick to take to the U.S. with us this Island lays in latitude 17° 29' N longitude 149° 14' W

August

On Monday the 7th we weighed anchor and steered to the southward and eastward bound to Antucket from whence we came

On Wednesday the 16th Pao Island one of the Society Group

On Friday the 18th about 6 o'clock P.M. we tried the pumps and found considerable water in her we pumped and it was four hours before we could get her free the first dose of any consequence before the whole voyage it was owing to heavy weather and carrying a heavy load of tarbass

September

On Wednesday the 2nd we saw a school of rattle whales it being very heavy weather we did not stop for them

On ~~the~~ Thursday the 5th there came on a gale from the eastward about 4 o'clock P.M. and all hands were called to take in sail we took all sail except a closed reefed main top sail and fore topmast stay sail which we lay too under untill Saturday the 10th about 4 o'clock P.M. when the gale abated and we made all sail again the ship was still leaking 500 strokes an hour

September 1843

On Monday the 11th about one o'clock in the morning it began to blow again from the westward all hands were called and we took in sail down to a close reefed main topmast which we secured under short sail 9 o'clock the same day when the gale abated and we made all sail again this was in Latitude 51 south and Longitude 95 west

On Thursday the 14th about 12 o'clock A.M. we saw a large steamer to the northward she showed American colours and passed about 10 miles to the eastward of us

About 4 o'clock on the same day we saw a brig standing to the northward she showed English colours we set our signal and she set hers she being an English vessel we could not read her signal we were then in Latitude 55.10 south and Longitude 85.20 west and steering E by N half E

On Wednesday the 20th we was off Cape Horn in Latitude 55.58 south and Longitude 67.21 west on the same day we shifted our course from E.N.E. to N.N.E.

On Thursday the 21st at 1 P.M. we saw a large steamer she showed American colours and passed about 3 miles to the eastward of us she was steering about S.W.

On Friday the 22nd about 4 o'clock P.M. we saw Staten Land we passed about 40 miles to the eastward of it this Island lays in Latitude 54.45 south and Longitude 63.42 west we was then steering N.E. by N

On Saturday the 23rd we saw a sail to the north we hauled the main yard aback and lay to for her she came up and spoke us and it proved to be the Ship Pocahontas of Baltimore 39 months out 1300 bl of sperm oil she sailed from Oyster Bay two days before we did bound home she was in company with us until Monday the 25th about 10 o'clock in the evening when there came on a furious gale we secured under a close reefed topsail and set the main topsail and fore topmast staysail and lay to until Thursday the 28th when it abated and we made all sail again

November 1843

On Tuesday the 20th about 6 o'clock P.M. we were going with studding sails out low and aloft with the wind from the southward it began to blow and we took in sail down to a loose reefed main topmast and fore topmast staysail which we lay too under untill 7 o'clock P.M. on the 21st when it began to abate gradually the wind shifted from south to west and we made all sail again

On Thursday the 22nd we saw a brig she was steering East and by the compass about a mile to the windward of us and showed American colours

About nine o'clock in the eve we saw a brig in our lee beam steering to the southward we was then steering N.W. in Latitude 28.57 and Longitude 56.30 West

On Tuesday the 27th about sundown it began to blow from the northward and we double reefed the topsails it continued blowing untill Wednesday about one o'clock when it abated and we made all sail again the wind still blowing from the northward

On Wednesday the 28th about 10 o'clock A.M. we saw a Brigantine one point on our lee bow and about 10 miles off she was steering to the southward and westward and showed English colours we was then in Latitude 32.24 North and Longitude 69 West

On Thursday the 29th about one o'clock in the morning the wind shifted from N to E.W.

On the same day we were put on short allowance we being short of provisions and water

On the same day about 4 o'clock P.M. we saw a ship three points on our lee bow she was steering west and were steering north we crossed her bows about a mile off we was at this time in Latitude 33.20 North and Longitude 70.30 West

November 1843

On Thursday the 29th about 7 o'clock P.M. we was by W with a fine breeze from the S.W. it began to increase untill it got to a heavy gale we took in all full except a close reefed main topsail and foresail about 11 o'clock the wind shifted to West and still continued blowing untill about 4 o'clock in the morning when it shifted to N.W. W. and it then began to abate and we began to make sail again we was then about off Cape Hatteras

On Thursday the 30th about 4 o'clock P.M. we saw a ship on our bow and about 10 miles off standing to the westward we was then steering the same way with the wind from the northward

December

On the 1st about 1 o'clock in the morning the wind shifted from North to West we set studding sails bow and aloft and carried them untill 10 o'clock A.M. when it blew so hard that we began to take in sail we was steering N.E. by N.

At 4 o'clock P.M. it blew so hard that we took in all sail except the foretopmast staysail which we lay too under untill 8 o'clock P.M. when it abated and we made sail up to double reefed topsails which we run under it still blowing a fresh gale

On Saturday the 2nd at 2 P.M. we saw a schooner on our lee beam hauled to the Eastward laying to at 3 o'clock P.M. we saw a brig on our lee beam and a ship on our weather beam they were about 10 miles apart and both laying too much short sail we passed between them

September 1843

On Tuesday the 26th while laying too in the said gale the sea was so heavy the and the ship rolled so that she rolled the starboard boat under and stove her to pieces we was then in latitude 50 south and longitude 51 west. The wind from the S. W.

October

On Monday the 16th we saw a ship on our larboard quarter and steering to the southward and eastward she run acrossed our stern about 8 miles distant she looked like an armed vessel

On Tuesday the 17th we saw a brigantine on our starboard beam and steering to the eastward sharp on the wind we was then in Latitude 24 south with the wind from the northward

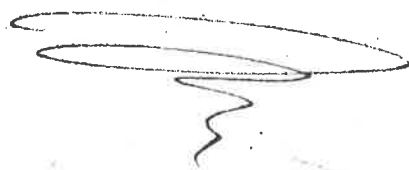
On Wednesday the 18th we saw a sail standing to the westward on the starboard tack doubtless the same vessel we saw on the 17th

On Thursday the 19th we spoke the barque Endeavour of New Bedford 25 days out 20 bbls of sperm oil she was bound around the Cape of Good Hope on the same day we took the south east trades

On Friday the 20th we saw a ship and two brigs the ship was standing to the northward and the two brigs was standing to the southward we was at this time steering North on the same day we passed the Island of Trinidad it lays in Latitude 20th 28 and Longitude 29th 5 West

On Tuesday the 21st we saw a Brig and a schooner they was steering about S. E. and they shewed American colours

On Wednesday the 22nd we saw a ship she was steering South she shewed American colours



October 1843

On sunday the 29th we passed the Island of Ferdinand Noronha on the East coast of South America it lays in Latitude 3.53 and longitude 32.27 West

On monday the 30th we crossed the Equator in Longitude 36.57 West we were then steering N.W. by N.

November

On monday the 1st about 9 o'clock in the evening there came on a squall and carried away a fore topmast studding sail boom.

On the night of friday 10th we carried away another fore topmast studding sail boom.

On the 11th about sundown we were steering N.W. by N. with studding sails out bow and aloft there came on a gale of wind from the eastward we took in all sail down to a close reefed main top sail and were until daylight the next morning when we made all sail again.

On the 14th we saw an English brig she crossed our bows about 2 miles off she was steering about west suppose she was bound to the West Indies on the same day we tore down the tryworks and threw them overboard we were at this time steering N.W.

On sunday the 18th about 4 o'clock P.M. we saw a Barge she showed English colours and passed about 2 miles to the leeward of us she was steering to the southward and westward sharp on the wind.

On tuesday the 20th we saw a barge she passed about a mile to the leeward of us steering to the eastward we were steering N.W. by N. with the wind from the southward.



December 1843

We were then under double reefed topsails with the wind
N.E. standing on the starboard tack

On the same evening at 12 o'clock we threw the deep sea lead
but got no bottom at 5 in the morning we threw the lead
but got no soundings

On Sunday the 3rd about 2 P.M. the wind shifted from
N.E. to North we tacked and stood on the larboard tack the
wind moderated and we made all sail again

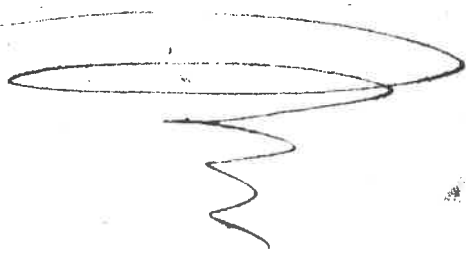
On Monday the 4th about 8 o'clock A.M. we saw a schooner
about 10 miles astern at 9 o'clock A.M. the wind shifted
from N.E. to S.W. we then steered N.E. by N at one
o'clock P.M. we saw a brig on the larboard beam she was
steering about N.W. we were at that time in Latitude 38. 58 N
and Longitude 71. 40 West
on the same night at 12 o'clock we threw the deep sea lead
and got soundings 45 fathoms and white sandy bottom at 5
o'clock the next morning we threw the lead and got soundings
30 fathoms and black and white sandy bottom

On Tuesday the 5th at 8 o'clock A.M. we raised Block Island
right ahead at 10 o'clock we took a Pilot from Block Island
about 7 o'clock in the evening of the same day we
anchored in Fishery harbour Martha's Vineyard

On Wednesday the 7th about 8 o'clock A.M. we weighed
anchor and made sail for Edgartown on the same
Island distance 30 miles about 12 o'clock the same day
we let go the anchor and warped along side of the
wharf

On the 10th we began to hoist out the cargo

On the 15th got the cargo hoisted out and sent down the
small spars



December 1843

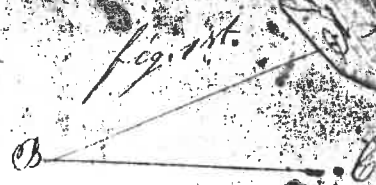
On Tuesday the 19th about 2 o'clock P.M. the
steam boat Massachusetts hatched on to tow the ship to
Nantucket about 3 $\frac{1}{2}$ the ship struck on Duckanoff
shoal the steam boat left us and proceeded to
Nantucket to wait for the tide to raise

About 9 o'clock the same evening the steam boat came
and hatched to us and about midnight we got along side
of Nantucket wharf. Thus ends a long and disagreeable
voyage of 47 months and 20 days in which time we
got 86 whales which yielded 2200 bbls of oil

Charles D. Gilbreth

PART I.

1. The inclination of two lines meeting in another, or the opening between them, is called an angle.



2. If the right line CD , fig. 2, fall upon another right line AB , so as to incline to neither side, but make the angles on each side equal, then those angles are called right angles; and the line CD is said to be perpendicular to the other line.



3. An obtuse angle is greater than a right angle; as ACD , fig. 3.

4. An acute angle is less than a right angle; as BCD , fig. 3.



5. A circle is a round figure bounded by a single line, in every part equally distant from the same point, which is called the centre. fig. 4th

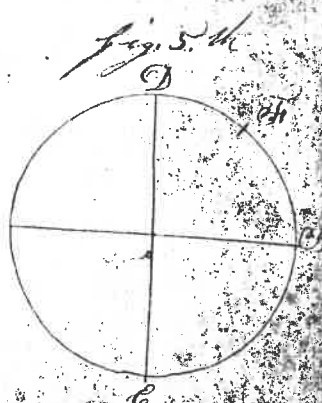
6. The circumference or periphery of a circle is the bounding line; as ACB , fig. 4th

7. The radius of a circle is a line drawn from the centre to the circumference; as CB , fig. 4th. Therefore all radii of the same circle are equal.



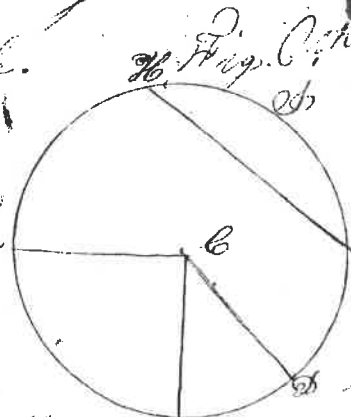
8. The diameter of a circle is a right line drawn from one side of the circumference to the other, passing through the centre; and it divides the circle into two equal parts, called semicircles; as ADB or CDE , fig. 5th

9. The circumference of every circle is supposed to be divided into 360 equal parts, called degrees; and each degree into 60 equal parts, called minutes; and each minute into 60 equal parts, called seconds; and these into thirds, &c.



An arc of a circle is any part of the circumference as BB' or PD , Fig. 5; and is said to be an arc of as many degrees as it contains both parts of the whole circle.

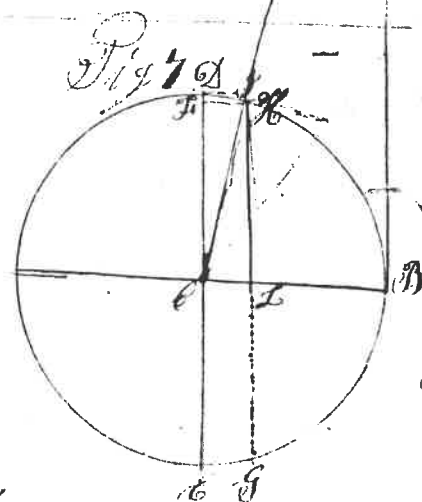
A chord is a line drawn from one end of an arc to the other, and is the measure of the arc; HB is the chord of the arc HGB , Fig. 6.



The segment of a circle is a part of a circle cut off by a chord; thus the space comprehended between the arc HGB and the chord HB is a segment, Fig. 6.

A sector of a circle is a space contained between two radii and an arc less than a semicircle; as BCD or ACD , Fig. 6.

The sine of an arc is a line drawn from one end of the arc, perpendicular to the radius or diameter drawn through the other end; or it is half the cord of the double arc; thus HL is the sine of the arc HB , Fig. 7.



The sines of the same diameter increase in length till they come to the centre, and so become radius, after which they diminish. Hence, it is plain that the sine of 90 degrees is the greatest possible sine, and is equal to the radius.

The versed sine of an arc is that part of the diameter or radius which is between the sine and the circumference; thus LB is the versed sine of HB , Fig. 7.

The tangent of an arc is a right line touching the circumference, and drawn perpendicular to the diameter; and is terminated by a line drawn from the centre through the other end of the arc; thus BN is the tangent of the arc HB , Fig. 7.

The secant is a line drawn from the centre through one of the arc till it meets the tangent; thus CN is the secant of the arc HB , Fig. 7.

The complement of an arc is what the arc wants of 90 degrees, or a quadrant; thus \widehat{HD} is the complement of the arc \widehat{BH} . Fig. 7.

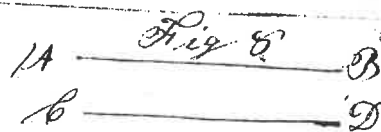
The supplement of an arc is what an arc wants of 180 degrees, or a semicircle; thus \widehat{ADH} is the supplement of the arc \widehat{BH} . Fig. 7.

The sine, tangent or secant of the complement of any arc is called the co-sine, co-tangent, or co-secant of the arc; thus, \widehat{HD} is the sine, \widehat{DD} the tangent, and \widehat{CD} the secant of the arc \widehat{BH} ; or they are the co-sine, co-tangent, and co-secant of the arc \widehat{BH} . Fig. 7.

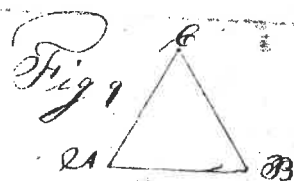
The measure of an angle is the arc of a circle contained between the two lines which form the angle, the angular point being the centre; thus, the angle \widehat{HCB} . Fig. 7. is measured by the arc \widehat{BH} ; and is said to contain as many degrees as the arc does.

The sine, tangent, or secant of an arc is also the sine, tangent, or secant of the angle whose measure the arc is.

Parallel lines are such as are equally distant from each other; as AB and CD . Fig. 8.



A triangle is a figure bounded by three lines; as ABC . Fig. 9.



An equilateral triangle has its three sides equal in length to each other. Fig. 9.

An isosceles triangle has two of its sides equal. Fig. 10.



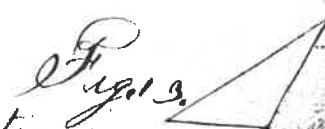
A scalene triangle has three unequal sides. Fig. 11.



A right angle triangle has one right angle in it. Fig. 12.



An obtuse angled triangle has one obtuse angle. Fig. 13.

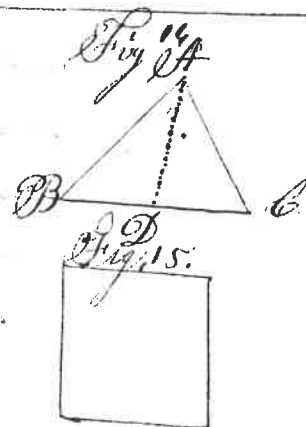


An acute angled triangle has all its angles acute. Fig. 9, or 10.

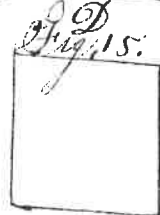
Acute and obtuse angled triangles, are called oblique angled triangles, or simply oblique triangles; in which the lower side is generally called the base, and the other two, legs.

In a right angled triangle the longest side is called the hypotenuse, and the other two, legs, or base and perpendicular.

The perpendicular height of a triangle is a line drawn from one of the angles perpendicular to its opposite side; thus, the dotted line of D. Fig. 14. is the perpendicular height of the triangle A B C.



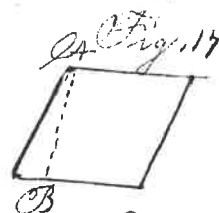
A square is a figure bounded by four equal sides, and containing four right angles. Fig. 15.



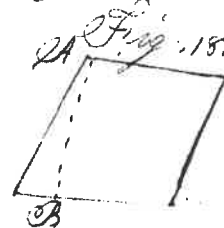
A parallelogram, or oblong square, is a figure bounded by four lines, the opposite ones being equal and the angles. Fig. 16.



A rhombus is a figure bounded by four equal sides, but has its angles oblique. Fig. 17.

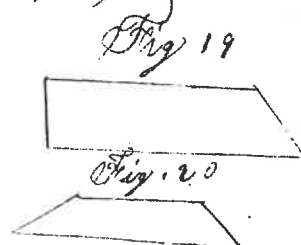


A rhomboid is a figure bounded by four sides, the opposite ones being equal, but the angles oblique. Fig. 18.



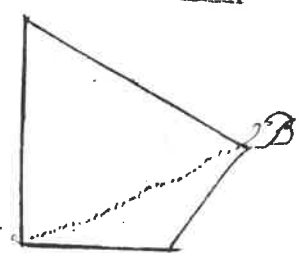
The perpendicular height of a rhombus or a rhomboid, is a line drawn from one of the angles to its opposite side; thus, the dotted lines A B. Figs 17 and 18, represent the perpendicular heights of those figures.

A trapezoid is a figure bounded by four sides, two of which are parallel though of unequal lengths. Fig. 19. and Fig. 20.



A trapezium is a figure bounded by four unequal sides. Fig. 21.

A diagonal is a line drawn between two opposite angles; as the line A B. Fig. 21. A



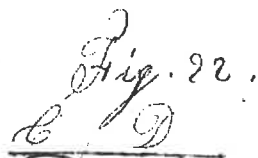
Figures which consist of more than sides are called
polygons; if the sides are equal to each other they are called
regular polygons, and are sometimes named from the num-
ber of their sides, as pentagon, or hexagon, a figure of five
or six sides, &c.; if the sides are unequal, they are called
irregular polygons.

Mr Eliz Anne Bowe

PART II.

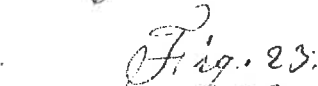
Problem Ist

To draw a line parallel to another line at a given distance; as at the point *C*, to make a line parallel to the line *AB*. Fig. 22.



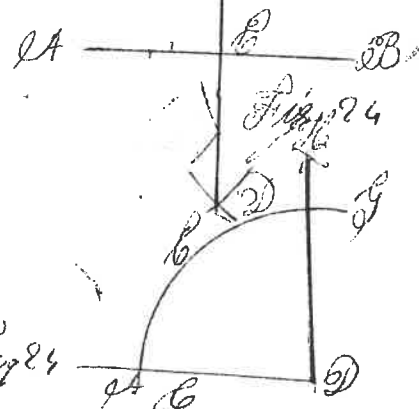
Problem II.

To bisect a given line; or, to find the middle of it. Fig. 23.



Problem III.

To erect a perpendicular from the end, or any part of a given line. Fig. 24.



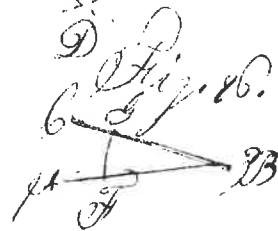
Problem IV.

From a given point, as at *C*, to drop a perpendicular on a given line *AB*. Fig. 25.



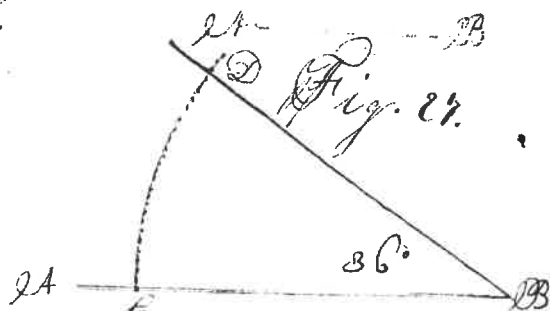
Problem V

To make an angle at *C*, equal to a given angle *ABE*. Fig. 26.



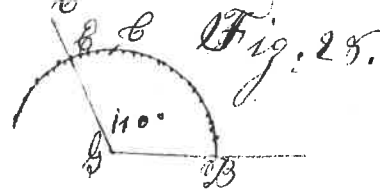
Problem VI.

To make an acute angle equal to a given number of degrees, suppose 36. Fig. 27.



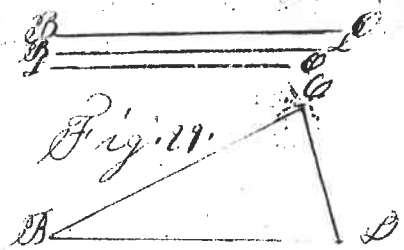
Problem VII

To make an obtuse angle, suppose of 110 degrees. Fig. 28.



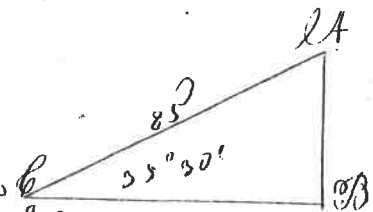
Problem VIII

To make a triangle of three given lines, as BC , BD , & CD . Fig. 29.



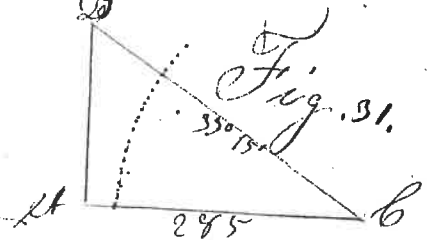
Problem IX

To make a right angled triangle, the hypotenuse and angles being given. Fig. 30.



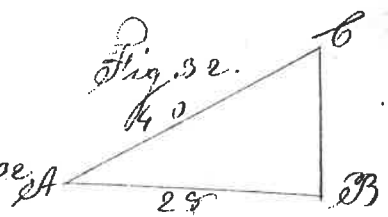
Problem X

To make a right angled triangle, the angles and one leg being given.



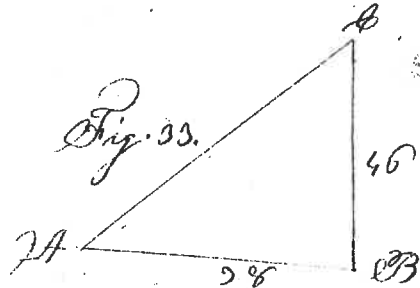
Problem XI

To make a right angled triangle, the hypotenuse and one leg being given. Fig. 32.



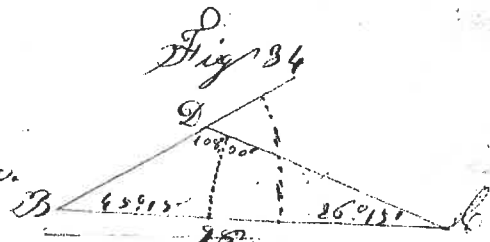
Problem XII

To make a right angled triangle, the two legs being given. Fig. 33.



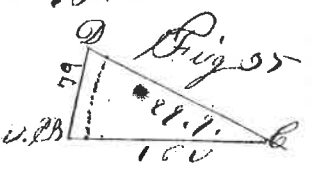
Problem XIII

To make an oblique angled triangle, the angles and one side being given.



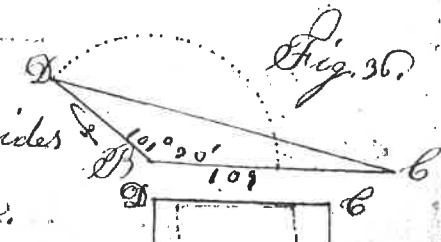
Problem XIV

To make an oblique angled triangle, two sides and an angle opposite to one of them being given.



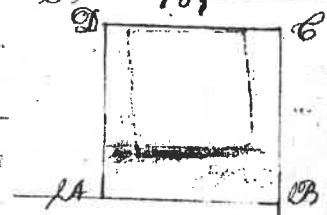
Problem XV

To make an oblique angled triangle, two sides and their contained angle being given.

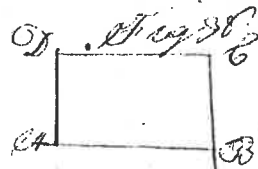


Problem XVI

To make a square. Fig. 37.

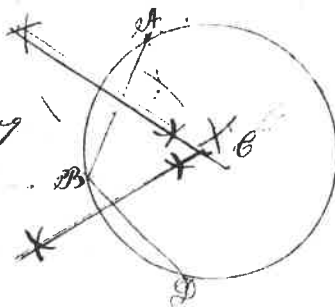


Problem. XVII.
To make a rectangular Fig. 38



Problem XVIII

Problem XVIII.
To describe a circle which shall pass
through any three given points, not lying
in a right line, as A, B, D, Fig 39



Problem XIX.

To find the centre of a circle.

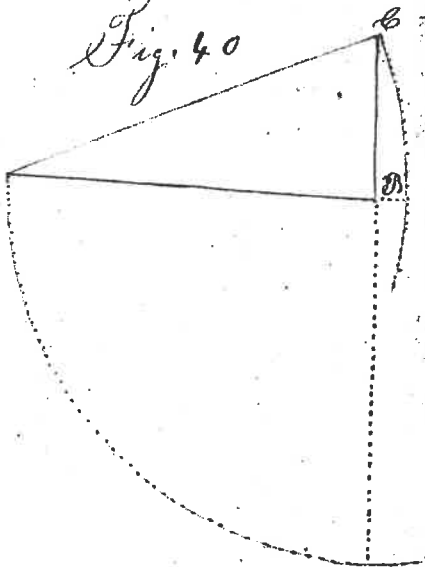
[illegible]

Trigonometry.

Proposition I.

In every right angled triangle, as ABC , Fig. 40, it is plain from Fig. 8, compared with the Geometrical definitions to which that Figure refers, that if the hypotenuse AC be made radius, and with it an arc of a circle be described from each end, BC will be the sine of the angle at A , and AB the sine of the angle at C ; that is, the legs will be sines of their opposite angles.

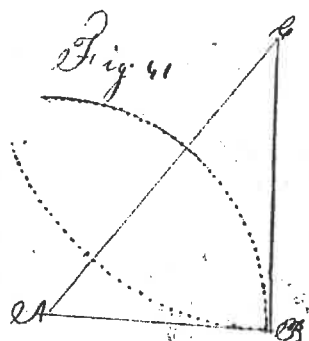
Fig. 40



Proposition II.

If one leg, AB , Fig. 41, be made radius, and with it on the point A an arc be described, then BC , the other leg, will be the tangent, and AC the secant of the angle at A ; and if BC be made radius, and an arc be described with it on the point C , then AC will be the tangent and AB the secant of the angle at C ; that is, if one leg be made radius the other leg will be a tangent of its opposite angle, and the hypotenuse a secant of the same angle.

Fig. 41



Case I.

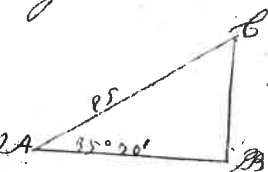
The angles and hypotenuse given to find the legs. Fig. 42.

Making the hypotenuse radius, the proportions will be;
To find the leg AB .

As radius
hyp. AC , 25
:: sine ACB , $34^{\circ}20'$
leg AB , 20.5 nearly

As radius
hyp. AC , 25
:: sine CAB , $55^{\circ}20'$
leg BC , 14.52 nearly

As radius
hyp. AC , 25
:: sine CAB , $55^{\circ}20'$
leg BC , 14.52 nearly



Trigonometry

Making the leg AB radius, the proportions will be:
To find the leg BC.

As secant to AB, $35^{\circ}30'20''$ --- 10.079514
hyp. AB, 25 --- 1.317940
radius --- 10.000000
leg AB, 20.35 --- 1.308625

To find the leg BC.
As secant to AB, $35^{\circ}30'$ --- 10.079514
hyp. AB, 25 --- 1.317940
tangent, to AB, $35^{\circ}30'$ --- 9.953267
leg BC, 14.50 --- 1.161894

Making the leg BC radius, the proportions will be
To find the leg AB

As secant to AB, $54^{\circ}30'10''$ 10.236046
hyp. AB, 25 --- 1.317940
tangent to AB, $54^{\circ}30'$ 10.166751
leg AB, 20.35 --- 1.308625

To find the leg BC
As secant to AB, $54^{\circ}30'$ 10.236046
hyp. AB, 25 --- 1.317940
radius --- 10.000000
leg BC, 14.50 --- 1.161894

By Natural sines

This case may be solved by natural sines, according to the following propositions:

As unity or 1, is to the length of the hypotenuse,
so is the natural sine of the smallest angle, to the
length of the ~~shortest~~ shortest leg. Or, so is the natural
sine of the largest angle, to the length of the
longest leg.

Or which is the same thing, multiply the natural sines
of the angles by the hypotenuse: the products
will be the length of the two legs.

Nat. sine of $35^{\circ}30'$
0.58010
Hyp. 25

Nat. sine of $54^{\circ}30'$
0.81412
Hyp. 25
407060
163524
2035300

210000
116140
145155.0

Leg AB 20.35

leg BC 14.50

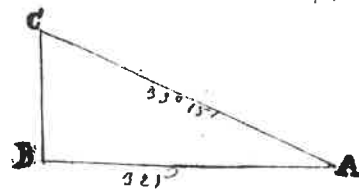
Case II.

The angles and one leg given to find the
hypotenuse and the other leg. Fig. 40.

Making the given leg radius, the proportions will be:

To find the hypotenuse
as radius,
leg AB, 328
sec. to AB, $33^{\circ}15'$
hyp. 228.6

To find the leg BC
as radius
leg AB, 328
tan to AB, $33^{\circ}15'$
leg BC 215.1



Trigonometry.

Making the hypotenuse radius, the proportion to find the angle ACB will be:

$$\begin{array}{l} \text{As hyp. } 50. \quad - 1.698940 \\ \text{: radius} \quad - 10.000000 \\ \text{:: leg } AB, 40 \quad 1.602060 \\ \hline \quad \quad \quad 11.602060 \\ \quad \quad \quad 1.500000 \end{array}$$

Trigonometry.

Making the leg BC radius, the proportions will be:

To find the hypotenuse

$$\begin{array}{l} \text{As tang. } ACB \ 56^{\circ}45' \quad - 10.183342 \\ \text{: leg } AB \ 325 \quad - 2.511883 \\ \text{:: secant } ACB \ 56^{\circ}45' \quad - 10.266994 \\ \hline \quad \quad \quad 12.372850 \\ \quad \quad \quad 1.0183342 \\ \hline \quad \quad \quad 12.599528 \end{array}$$

To find the leg BC

$$\begin{array}{l} \text{As tang. } ACB \ 56^{\circ}45' \quad - 10.183342 \\ \text{: leg } AB \ 325 \quad - 2.511883 \\ \text{:: radius} \quad - 10.000000 \\ \hline \quad \quad \quad 12.511883 \\ \quad \quad \quad 1.0183342 \\ \hline \quad \quad \quad 12.328541 \end{array}$$

Making the hypotenuse radius the proportions will be:

To find the hypotenuse

$$\begin{array}{l} \text{As sine } BCA, 56^{\circ}45' \quad - 9.922355 \\ \text{: leg } AB, 325 \quad - 2.511883 \\ \text{:: radius} \quad - 10.000000 \\ \hline \quad \quad \quad 12.511883 \\ \quad \quad \quad 9.922355 \\ \hline \quad \quad \quad 12.589528 \end{array}$$

To find the leg BC

$$\begin{array}{l} \text{As sine } BCA, 56^{\circ}45' \quad - 9.922355 \\ \text{: leg } AB, 325 \quad - 2.511883 \\ \text{:: sine } BAC, 33^{\circ}15' \quad - 9.739013 \\ \hline \quad \quad \quad 12.250816 \\ \quad \quad \quad 9.922355 \\ \hline \quad \quad \quad 12.328541 \end{array}$$

By Natural Sines.

To solve this case by natural sines, institute the following proportions:

To find the hypotenuse.

As the natural sine of the angle opposite

the given leg, is to the length of the leg,

so is unity, or 1, to the length of the hypotenuse.

Or which is the same thing, divide the given leg by

the natural sine of its opposite angle and the

quotient will be the hypotenuse.

Trigonometry

To find the other leg

As the natural sine of the angle opposite
the given leg, is to the length of the given
leg, so is the natural sine of the angle
opposite the other leg to the length of the other leg.

Example

Given leg 325. Nat. sine of $36^{\circ}43'$ the angle opposite
the given leg 0.83629. Nat sine of $33^{\circ}15'$ the angle
opposite the other leg 0.54829.

As 0.83629 : 325 :: 0.54829 : 213.03.

As 0.83629 : 325 :: 0.54829 : 213.03.

Case III

The hypotenuse and one leg given to
find the angles and the other leg. Fig. 44.

In the triangle ABC , given the hypotenuse 50 and the
leg AB 40 to find the angles and leg BC .

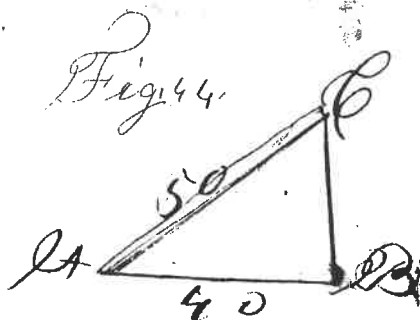


Fig. 44.

Trigonometry.

Making the hypotenuse radius, the proportion to find the angle ACB will be:

$$\begin{array}{rcl}
 \text{As hyp. } 50. & - & 1.698970 \\
 \text{: radius} & - & 10.000000 \\
 \text{.. leg } AB, 40 & & 1.602060 \\
 & \hline & 11.602060 \\
 \text{: sine } ACB, 53^\circ 8' & & 1.698970 \\
 & \hline & 9.903090
 \end{array}$$

The angle ACB being $53^\circ 8'$ the other is consequently $36^\circ 52'$.

Making the leg AB radius, the angle BAC may be found by the following proportion

$$\begin{array}{rcl}
 \text{As leg } AB, 40 & - & 1.602060 \\
 \text{: radius} & - & 10.000000 \\
 \text{.. hyp. } 50 & - & 1.698970 \\
 & \hline & 11.698970 \\
 \text{: sec. } BAC, 36^\circ 52' & & 1.602060 \\
 & \hline & 10.096910
 \end{array}$$

The angles being found, the leg BC may be found by either of the preceding cases, it is 30.

By Natural sines

The angle opposite the given leg may be found by the following proportion

As the hypotenuse is to unity or 1.00 is the given leg
To the nat. sine of its opposite angle.

Or which is the same thing, divide the given leg by the Hypotenuse, and the quotient will be the natural sine.

Example

The leg AB 40 divided by the hypotenuse 50 gives a quotient 0.80000 which looked in the table of natural sines the nearest corresponding number of degrees and minutes will be found to be $53^\circ 8'$ the angle ACB .

Trigonometry

By the square root

In this case the required leg may be found by the square root, without finding the angles; according to the following proportion;

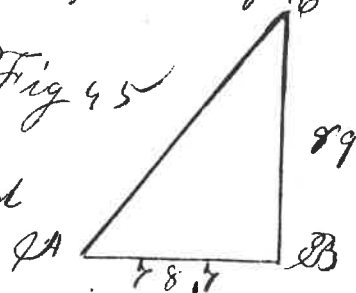
In every right angled triangle, the square of the hypotenuse is equal to the sum of the squares of the two legs. Hence;

The square of the given leg being subtracted from the square of the hypotenuse, the remainder will be the square of the required leg.

As in the preceding example; the square of the leg AB is 1000; this subtracted from the square of the hypotenuse 50 which is 2500 leaves 1500, the square of the leg BC, the square root of which is 38.7, the length of the leg BC as found by logarithms.

Case IV.

Fig 45



The legs given to find the angles and the hypotenuse. Fig 45—

In the triangle ABC, given the leg AB 78.7 and the leg BC 89; to find the angles and the hypotenuse.

Making the leg AB radius, the proportion to find the angle BCA will be;

$$\begin{array}{rcl}
 \text{As leg AB, } 78.7 & - & 1.895945 \\
 \text{radius} & - & 10.000000 \\
 \text{leg BC, } 89 & - & 1.949390 \\
 \hline
 & & 11.949390 \\
 & & 1.895945 \\
 \hline
 & & 10.053445
 \end{array}$$

The angle A C B is consequently $41^{\circ} 29'$

Making the leg BC radius the proportion to find the angle CBA will be similar, with the obvious difference

Trigonometry

The angles being found, the hypotenuse may be found by case 2. it is nearest 119.

By the square root.

In this case the hypotenuse may be found by the square root without finding the angles; according to the following proposition.

In every right angled triangle, the sum of the squares of the two legs is equal to the square of the hypotenuse.

In the above example, the square of EA 38.7 is 1497.69 the square of BC 89 is 7921 these added make 14114.69 the square root of which is nearest 119.

By Natural Sines

The hypotenuse being found by the square root the angles may be found by nat. sines according to the preceding case.

Hyp. leg BC . Nat sine
119) 89,00000 (74749

833	000
540	
475	
940	
833	
1040	
950	
1180	
1071	
109	

The nearest degrees and minutes corresponding the above nat sine are $48^{\circ} 24'$ for the angle BAC . The difference between this and the angle as found by logarithms is occasioned by dividing by 119, which is not the exact length of the hypotenuse it being a fraction too much.

Trigonometry

Part II

Oblique Trigonometry

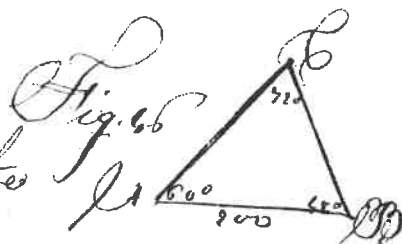
The solution of the two of Oblique Trigonometry depends on the following PROPOSITION.

IN ALL PLANE TRIANGLES, THE SIDES ARE IN PROPORTION TO EACH OTHER AS THE SINES OF THEIR OPPOSITE ANGLES. THAT IS, AS THE SINE OF ONE ANGLE IS TO ITS OPPOSITE SIDE, SO IS THE SINE OF ANOTHER ANGLE TO ITS OPPOSITE SIDE.

OR, AS ONE SIDE IS TO THE SINE OF ITS OPPOSITE ANGLE, SO IS ANOTHER SIDE TO THE SINE OF ITS OPPOSITE ANGLE.

Case I

The angles and one side given to find the other sides Fig. 46



In the triangle ABC, given the angle at B 48; the angle at C 72; consequently, the angle at A 60; and the side AB 200, to find the sides AC and BC.

To find the side AC.

As sine of C 72°	9.958206
: side AB 200	2.301030
∴ sine of B 48°	9.871033
	12.142103
	9.944206
: side AC 156	2.197877

To find the side BC

As sine of C 72°	9.958206
: side AB 200	2.301030
∴ sine of A 60°	9.933531
	12.259507
	9.944206
: side BC 182	2.260345

By Natural sines

As the nat. sine of the angle opposite the given side is to the given side, so is the nat. sine of the angle opposite either of the required sides to the required side.

Given side 200: nat. sine of 72; its opposite angle

0.95115: nat. sine of ABC 48; 0.743143: nat. sine of BAC 60 0.46817 thus

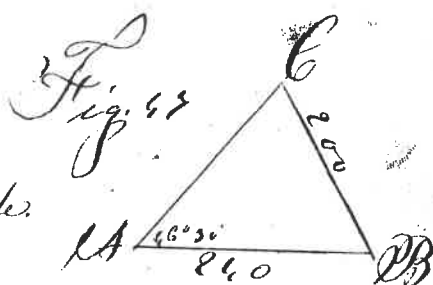
0.95115: 200 :: 0.743143: 156
0.95115: 200 :: 0.46817: 98

Trigonometry

Case II

Two sides, and an angle opposite to one of them given, to find the other angles and side.

Fig. 47.



In the triangle ABC , given the side AB 240, the side BC 200, and the angle at A $46^\circ 30'$; to find the other angles and the side AC .

To find the angle ACB

As side BC 200 ... 2.301030

sine BCA $46^\circ 30'$... 2.860562

side AB 240

$$\begin{array}{r} 2.380211 \\ 17.240773 \\ 2.801030 \\ \hline 2.939994 \end{array}$$

sine ACB , $60^\circ 30'$ nearly 2.933333

The side AC will be found by Case I to be nearest 253.

By Natural Sines.

As the side opposite the given angle is to the nat. sine of that angle, so is the other given side to the nat sine of its opposite angle.

One given side 200, nat. sine of $46^\circ 30'$, its opposite angle, 0.82533, the other side 240.

As 200 : 0.82533 :: 240 : 0.88044 $26^\circ 30'$.

Angle at A $46^\circ 30'$

C $60^\circ 30'$

Sum of the three angles $107^\circ 00'$

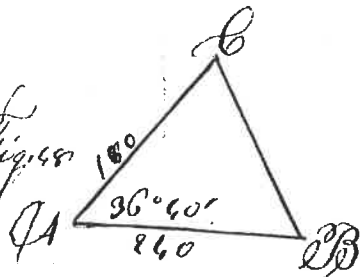
Sum of two 107°

Angle at B 73°

Trigonometry

Case III.

Two sides and their contained angle given, to find the other angles and side. Fig. 48



The solution of this case depends on the following proposition:
In every plane triangle, as the sum of any two sides is to their difference, so is the tangent of half the sum of the two opposite angles to the tangent of half the difference between them.

Add this half difference to half ^{the} sum of the angles and you will have the greater angle, and subtract the half difference from the half sum and you will the lesser angle.

In triangle ABC, given side 240, side AC 180 and angle at A 36° 40' to find the other angles and side.

side AB	—	240	angle C	—	180
side AC	—	180	angle A	—	36° 40'
sum of the two sides	—	420	difference	—	60

The given angle BCA 180°; subtracted from 180° leaves 0° 20' the sum of the other two angles, the half of which is 0° 10'.

As the sum of two sides, 420
: their difference 60
:: tangent half unknown ang. 0° 10'

1 tangent half difference 23° 20' nearly
The half of the two unknown angles
The half difference between them
Add, gives the greater angle ACB
Subtract, gives the lesser angle ABC

Side BC may be found by case I of II.

2.623269
1.539881
10.459695
12.252846
2.623269
2.639881
51° 40'
23 20
95.00
48 23